



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,472	11/26/2003	Feng Chen	TI-35189	7655
23494	7590	06/23/2005	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED			WAMSLEY, PATRICK G	
P O BOX 655474, M/S 3999			ART UNIT	
DALLAS, TX 75265			PAPER NUMBER	
			2819	
DATE MAILED: 06/23/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/723,472

Applicant(s)

CHEN, FENG

Examiner

Patrick G. Wamsley

Art Unit

2819

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 13-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 21 and 22 is/are rejected.
- 7) ☒ Claim(s) 3-12, 23 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election of Species***

Applicant's election of claims 1-12 and 21-23, readable upon the first species depicted in Figure 7, in the reply filed on 05/16/2005 is acknowledged. Claims 13-20 are hereby withdrawn from consideration. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

### ***Specification***

The disclosure is objected to because of the following informalities:

Page 3, ¶0012: Change "either a high pass" to -- either white noise or high pass profiles --.

Page 4, ¶0014: Change "converted resemble" to -- converted to resemble --.

Appropriate correction is required.

The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Objections***

Claims 1 and 21 are objected to because of the following informalities:

First, the preamble of each claim indicates that a DAC is part of a modulator that provides a digital output. This description is confusing because a DAC inherently produces an analog output. Applicant should amend both claims to indicate that the DAC is part of a feedback loop in an ADC.

Second, a low pass profile will not suppress errors at "higher" frequencies, as noise has been shifted to lower frequencies. Applicant should change both claims to reflect the actual change in DAC error distribution.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,406,283 to Leung, hereafter Leung, in view of "A Study of Dynamic Element-Matching Techniques for 3-Level Unit Elements" to Rombouts et al, hereafter Rombouts.

For independent claims 1 and 21, Leung suppresses digital to analog, hereafter DAC, error arising from mismatched elements by means of dynamic element matching. Regarding the "half a sampling frequency" limitation, Leung translates harmonic distortion components to frequency components in the vicinity of half a sampling frequency [col. 2, lines 24-27]. Regarding the "low pass profile" limitation, Leung normally provides a high frequency spectrum [col. 8, line 58].

However, Rombouts discloses bandpass mismatch shaping [Page 1182]. For low frequencies, a bandpass filter presents a "low pass profile," satisfying independent claims 1 and 21. At the time of the invention, it would have been obvious to one of ordinary skill in the art to have applied the bandpass teachings of Rombouts to Leung.

Art Unit: 2819

The motivation would have been to push the error out of the band of interest; as suggested by Rombouts [Page 1182].

For claims 2 and 22, Leung uses only a single pointer [generated by block 11: Fig. 3] per clock cycle.

### ***Allowable Subject Matter***

Claims 3-12 and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the references of record neither reveal nor render obvious the recited combination including a low pass averaging (LPA) index decoder configured to producing DAC error in a low pass profile.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 6,867,721 to Lin provides a spectral shaping dynamic encoder for a DAC. U.S. Patents 6,803,869 and 6,784,816 to Melanson et al connect a DAC [203] to dynamic element matching logic [205]. U.S. Patent 6,738,004 to Melanson links a mismatch noise shaper [108] to a DAC unit [110]. U.S. Patent 6,737,999 to Schreier describes mismatch shaping for DAC. U.S. Patent 6,697,004 to Galton et al provides a mismatch-shaping DAC. U.S. Patent 6,697,003 to Chen discloses dynamic element matching. U.S. Patent 6,611,221 to Soundarapandian et al shows dynamic element matching using data-weighted averaging.

Art Unit: 2819

U.S. Patent 6,535,155 to Ruha suppresses tones induced by dynamic element matching algorithms. U.S. Patent 6,304,608 to Chen et al provides dynamic element matching with reduced baseband tones. U.S. Patent 4,193,118 to Nash et al discloses a low pass digital averaging filter.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick G. Wamsley whose telephone number is (571) 272-1814. The official facsimile number is (703) 872-9306. An alternate facsimile number, (571) 273-1814, should only be used for unofficial documents.

A handwritten signature in black ink, appearing to read "Patrick G. Wamsley".

**Patrick G. Wamsley**

**June 22, 2005**